

Frozen section detected perineural spread in a grossly normal nerve away from tumor changes the surgical plan in parotid cancer

ABSTRACT

Perineural spread (PNS) through the facial nerve is a well-recognized pathway of spread in parotid cancers. Negative margins in the facial nerve are important in the total extirpation of cancer. We report a case of mucoepidermoid carcinoma of the parotid which was involving only the upper temporofacial division of the facial nerve at the periphery clinically and per-operatively. The upper trunk was divided at about 3cm away from the tumor at its junction with the lower trunk and the nerve was grossly normal. To our surprise disease was extending at this distance as a PNS in the frozen section analysis. This unexpected finding made the resection margin positive and we had to sacrifice the main trunk of the facial nerve as back as possible in the parotidectomy field for a negative margin in the nerve which was confirmed with frozen section again. The case emphasizes the importance of microscopic margin assessment of facial nerve in parotid cancers with the involvement of nerve at branches, even if imaging is negative or gross disease is not seen at the cut end or distant from the tumor-involved area.

Keywords: Facial nerve, frozen section, parotid cancer, perineural spread

INTRODUCTION

Among the major salivary glands, malignancies occur most commonly in the parotid gland, the most common being mucoepidermoid carcinoma.^[1] The majority of these cases in the early stages are amenable for conservative parotidectomy, saving the facial nerve function without compromising the oncological cure. A common presenting symptom in parotid cancers is facial nerve weakness.^[2] If the nerve is intraoperatively seemed to be involved by the tumor, we must sacrifice that part of the nerve for clearance. Perineural invasion (PNI) is a poor prognostic indicator with a higher rate of local recurrences.^[3] Preoperative imaging can detect these perineural spreads (PNSs) and frozen section examination help to decide the extent of surgery.^[4]

CASE REPORT

A 55-year-old male without any comorbidities presented with a parotid region swelling on the left side of 1-year duration and recent onset pain. There was no trismus, increase in the size

of the swelling with chewing or paresthesia over the face. He was a chronic smoker and alcoholic. On examination, he had a 3 cm × 3 cm hard nontender swelling over the left parotid region, clinically fixed to the masseter. There was an absence of wrinkling of the left side of the forehead and weak left eye closure with no lower face weakness, suggestive of the involvement of upper branches of the facial nerve by the disease.

Magnetic resonance imaging (MRI) showed a well-defined altered intensity signal lesion measuring 2.1 cm × 2 cm with

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minimal peripheral contrast enhancement infiltrating the masseter medially. The facial nerve was not thickened. Fine needle aspiration cytology (FNAC) suggested a malignant parotid neoplasm. In a multidisciplinary tumor board, it was decided to proceed with surgery.

Modified Blair's incision was used with extension in the neck for node dissection. Intraoperatively, it was seen that there were two major divisions of the nerve trunk. The upper division was involved where it passes through the tumor and from the lower major division there was a small twig going through the tumor as well [Figure 1a]. Tumor resected with part of masseter along with superficial and deep lobe of parotid radically. The upper division of the facial nerve was cut from the origin from the trunk along with the smaller twig [Figure 1b]. The cut end was 3 cm back from the tumor edge and the nerve there was normal on inspection. The lower major division of the nerve was maintained in continuity. Both the proximal cut ends of the nerves were sent for frozen section analysis. The level II lymph nodes were dissected and sent for imprint cytology as well.

The frozen section [Figure 2a and b] revealed the involvement of the proximal cut end of the upper division nerve by tumor PNS which was quite unexpected for the surgical team. The separate smaller twig sent was negative for the neoplasm. As a PNI makes a positive margin surgical plan was modified to sacrifice the trunk of the facial nerve. The facial nerve trunk was cut as back as possible in the same field close to the stylomastoid foramen and sent for a frozen section examination, which came negative for cancer. One level II lymph node was positive for malignant cells in the imprint cytology and we proceeded with Modified Radical Neck dissection. The final histopathology diagnosis was high-grade mucoepidermoid carcinoma infiltrating skeletal muscle and facial nerve [Figure 2c and d]. The most proximal cut end of the facial nerve was confirmed negative for PNS.

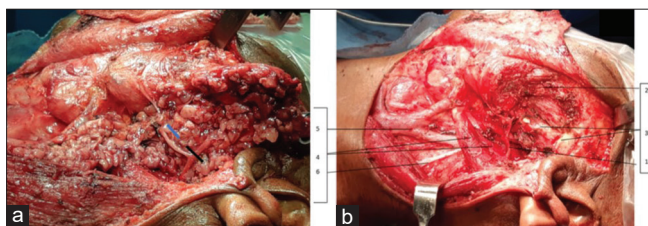


Figure 1: (a) Superficial parotid lobe mobilized from facial nerve; upper temporofacial division (black); smaller branch from the lower cervicofacial division (blue). (b) Radical parotidectomy and level II dissection; intact facial nerve (1), masseter (2), mandible bone and temporomandibular joint capsule (3), digastric and stylohyoid (4), IJ vein (5), and spinal accessory nerve (6)

DISCUSSION

Twenty percent of the neoplasms occurring in the parotid gland are malignant, mucoepidermoid carcinoma being the most common.^[5] FNAC is the standard method for preoperative diagnosis. Cross-sectional imaging helps to define the local extent, infiltration to deeper structures, involvement of deep lobe, and lymphadenopathy. MRI is the investigation of choice to rule out a PNS when the facial nerve is clinically involved.^[6] Surgical removal of the tumor-bearing gland with negative margins and lymphadenectomy is the mainstay of management in locoregional disease with adjuvant therapy individualized to cases.^[1] Radical surgeries are indicated in getting a negative margin, considering the neurotropism of parotid cancers.

PNI is a method of tumor dissemination where the cancer cells enter the perineural space and through that reach distant places. PNI definitions have come a long way up from the earlier Batsakis proposal of “in, around, and through the nerve”.^[7] This pathway allows a tumor to go outside its gross boundaries and makes the “margin positive/close” in a routine parotidectomy. Huyett *et al.* in their study of 168 parotid cancers found 46.2% of cases to have PNI.^[3] PNI is the terminology used for describing the smaller unnamed nerve branches getting involved by the tumor, whereas PNS is the involvement of a named larger nerve through which the tumor grows out of its confinements.^[8] Ross *et al.* in their cohort study identified nerves <0.1 mm in diameter if involved by the PNI have lesser risk than larger nerves in squamous cell carcinoma.^[9] The larger named nerves if involved by PNS take the disease out of its confinements creating confusion in treatment if found in postoperative pathology reports. Furthermore, a

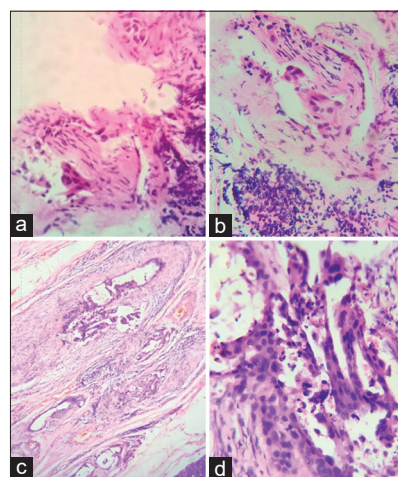


Figure 2: (a and b) Frozen section-perineural spread (H and E, x200). (c) Final histopathology showing perineural spread (H and E, x40), (d) Perineural spread (H and E, x400)

nerve palsy by external compression only is excluded from these definitions.

Facial nerve sacrifice is required if preoperatively there is facial palsy related to the tumor, or per operatively the nerve is infiltrated by the neoplasm. Clinical examination and MRI help the surgeon to predict the need for facial nerve resection and prepare for the reconstruction with direct facial nerve suture, interposition graft, or by a hypoglossal-facial nerve interposition jump anastomosis.^[2] If the PNS is detected in the MRI preoperatively, the surgeon should be willing to trace the nerve back to a negative margin even if it requires a mastoidectomy to follow the nerve. MRI identified the extent of PNS compared to histology in 83% of the cases in a study by Gandhi *et al.*^[6] Frozen section analysis helps to define proximal negative margins and skip lesions are not common. This case shows that even grossly normal-looking nerves can have PNS and can be missed in MRI.

CONCLUSION

This case exemplifies the importance of margin clearance confirmation with microscopy in involved facial nerves of parotid malignancies even if the cut end is at a distance, and appears uninvolved during surgery. Care taken in these finer details may improve the outcome of radical surgeries.

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Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information

to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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